



**Objectives:**

Examine the ability of current surveillance systems to assess and monitor disparities in 1) vision loss, 2) eye disease, 3) vision-related functioning, 4) social participation restriction, 5) access to vision and eye care and 6) access to supports and services for those with visual impairment

- a. Identify the general characteristics, strengths, and limitations of these surveillance systems
- b. Determine the extent to which these surveillance systems allow adequate collection, analysis, and interpretation of data
- c. Determine the ability of these surveillance systems to 1) estimate the magnitude of the problem, 2) determine distributions, including geographic, 3) generate and test hypotheses, 4) stimulate research, program design, implementation and evaluation, 5) detect changes in health practices

**Methods:**

1. We identified a list of national and statewide population-based surveys through expert canvassing and review of the scientific literature
2. We explored the components of each survey for inclusion, based on the following criteria:
  - a. Survey contained a component related to vision,, eye disease, vision-related disability, and/or utilization of vision and eye care treatment or rehabilitation services
  - b. Survey was **ongoing and continuous** (administered at least every 5 years)
  - c. Survey included adults  $\geq 40$  years of age, who are at greatest risk for visual impairment



**Table 1a. General characteristics, strengths, and limitations of these surveillance systems**

Survey	Description	Study Design					
		Population-level/ Population Size	Survey Type	Method of Data Collection	Data Linkage	Strengths	Limitations
<b>National Health Interview Survey (NHIS)</b>	<ul style="list-style-type: none"> <li>• Contains Core Questions administered annually (Household, Family, Sample Adult, and Sample Child components)</li> <li>• Visions Supplement administered 2002 and 2008 only</li> </ul>	<ul style="list-style-type: none"> <li>• National</li> <li>• Estimated 35,000 households and 87,000 individuals surveyed annually (for Core Questions)</li> <li>• Participants are adults and children of all ages</li> </ul>	<ul style="list-style-type: none"> <li>• Cross sectional</li> </ul>	<ul style="list-style-type: none"> <li>• Personal household interview</li> <li>• Core question data collected on an on-going basis</li> <li>• Proxy respondents are allowed</li> </ul>	Can be linked with: <ul style="list-style-type: none"> <li>• National Death Index (NDI)</li> <li>• Medicare Enrollment and Claims Data</li> <li>• Social Security Benefits History Data</li> <li>• MEPS</li> </ul>	<ul style="list-style-type: none"> <li>• National, population-based survey</li> <li>• Provides information on functioning, social participation restriction, access to care, and access to supports and services</li> <li>• Capacity for monitoring disparities (gender, age, SES, race)</li> </ul>	<ul style="list-style-type: none"> <li>• Does not validate data with clinical examination (self-reported data)</li> <li>• Several key vision questions are asked on the supplement component, which is not administered on a regular basis</li> <li>• Does not include institutionalized population (e.g. nursing home residents) or military personnel</li> <li>• Time between collection of data and release may be a minimum of 6 months</li> </ul>
<b>Behavioral Risk Factor Surveillance System (BRFSS)</b>	<ul style="list-style-type: none"> <li>• Contains Core Component (fixed core, rotating core, and emerging core), Optional Modules (including the Vision Impairment and Access to Eye Care Module), and State-added questions</li> </ul>	<ul style="list-style-type: none"> <li>• State-level</li> <li>• More than 350,000 adults interviewed annually (for Core Component)</li> <li>• Participants are 18</li> </ul>	<ul style="list-style-type: none"> <li>• Cross sectional</li> </ul>	<ul style="list-style-type: none"> <li>• Annual telephone survey</li> <li>• All data is self-reported</li> </ul>	Can be linked with: <ul style="list-style-type: none"> <li>• EPA Air Quality System Database (AQS) 2001-2006</li> </ul>	<ul style="list-style-type: none"> <li>• Measures functioning, health risk behaviors, preventive health practices, and health care access</li> <li>• A source of timely, accurate, state-level</li> </ul>	<ul style="list-style-type: none"> <li>• Does not validate data with clinical examination (self-reported data)</li> <li>• Several key vision questions are asked on the vision component, which has been administered in 19 states</li> </ul>



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		Population-level/ Population Size	Survey Type	Method of Data Collection	Data Linkage			
	<ul style="list-style-type: none"> <li>• Vision Module available to states beginning in 2006</li> </ul>	years or older					<ul style="list-style-type: none"> <li>• data on health-related behaviors, specifically as they relate to chronic diseases and injury</li> <li>• Data is collected by December and available by April the following year</li> <li>• State data can be combined to produce national estimates for certain variables</li> </ul>	<p>between 2006-2008</p> <ul style="list-style-type: none"> <li>• Telephone survey may introduce bias due to non-response and noncoverage</li> <li>• Does not include institutionalized population (e.g. nursing home residents) or military personnel</li> </ul>
<b>National Health and Nutrition Examination Survey (NHANES)</b>	<ul style="list-style-type: none"> <li>• Interview administered annually (with vision component)</li> <li>• Vision exam administered annually</li> <li>• Ophthalmology exam administered in 2007-2008, 2005-2006</li> </ul>	<ul style="list-style-type: none"> <li>• National</li> <li>• NHANES (1999-present) surveys approximately 5,000 persons annually</li> <li>• Participants are adults and children of all ages</li> </ul>	<ul style="list-style-type: none"> <li>• Cross sectional</li> </ul>	<ul style="list-style-type: none"> <li>• Personal household interview</li> <li>• Vision and Ophthalmologic examination</li> </ul>	<p>Can be linked with:</p> <ul style="list-style-type: none"> <li>• National Death Index (NDI)</li> <li>• EPA Air Quality System Database (AQS) 2001-2006</li> <li>• Medicare Enrollment and Claims Data</li> <li>• Social Security Benefits History Data</li> </ul>	<ul style="list-style-type: none"> <li>• National, population-based survey</li> <li>• Data from clinical examination and self-report are collected</li> <li>• Vision component administered annually</li> </ul>	<ul style="list-style-type: none"> <li>• Survey data are released on public use data files every two years</li> <li>• Does not include the institutionalized population (e.g. nursing homes)</li> <li>• Vision component NOT included in 2009-2010 survey</li> </ul>	



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Survey	Description	Study Design					
		Population-level/ Population Size	Survey Type	Method of Data Collection	Data Linkage	Strengths	Limitations
<b>Medical Expenditure Panel Survey (MEPS)</b>	<ul style="list-style-type: none"> <li>• Continuous, nationally representative survey of U.S. non-institutionalized population (subsample of NHIS participants)</li> <li>• Survey (including vision component and diabetes care module) administered annually</li> </ul>	<ul style="list-style-type: none"> <li>• National</li> <li>• Approximately 12,000-13,000 persons are surveyed biannually</li> <li>• Participants are adults and children of all ages</li> </ul>	<ul style="list-style-type: none"> <li>• Longitudinal panel (2.5 year follow-up)</li> </ul>	<ul style="list-style-type: none"> <li>• Personal household interview</li> <li>• Repeated interviews conducted every 5-6 months</li> </ul>	Can be linked with: <ul style="list-style-type: none"> <li>• NHIS</li> </ul>	<ul style="list-style-type: none"> <li>• National, population-based survey</li> <li>• Vision component administered annually</li> <li>• Provides information on access to care</li> <li>• Panel participants rotate every 2.5 years, allowing researchers to monitor changes over time</li> </ul>	<ul style="list-style-type: none"> <li>• Does not validate data with clinical examination (self-reported data)</li> <li>• Does not include institutionalized population (e.g. nursing home residents) or military personnel</li> </ul>
<b>Medicare Current Beneficiary Survey (MCBS)</b>	<ul style="list-style-type: none"> <li>• Continuous, nationally representative sample of aged, disabled, and institutionalized Medicare beneficiaries</li> <li>• Collects information on health status, health care use/expenditures, health insurance coverage, and socioeconomic/demographics</li> <li>• Participants remain in the MCBS for 4 years</li> </ul>	<ul style="list-style-type: none"> <li>• National</li> <li>• Estimated 12,000 persons surveyed three times per year (beginning in 1991)</li> <li>• Participants are adults ≥ 65 years</li> </ul>	<ul style="list-style-type: none"> <li>• Longitudinal panel design ( 4 year follow-up)</li> </ul>	<ul style="list-style-type: none"> <li>• Face to face interviews in households and institutions</li> </ul>	Can be linked with: <ul style="list-style-type: none"> <li>• Medicare Enrollment and Claims Data</li> </ul>	<ul style="list-style-type: none"> <li>• Data can be easily merged with Medicare claims to enhance analytic power</li> <li>• Institutionalized beneficiaries included in the survey</li> </ul>	<ul style="list-style-type: none"> <li>• Only includes Medicare beneficiaries</li> <li>• Does not validate data with clinical examination (self-reported data)</li> </ul>



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<b>National Hospital Discharge Survey (NHDS)</b>	<ul style="list-style-type: none"> <li>Collects information on patient characteristics (demographics, payment source, diagnoses, and procedures) of inpatients in short-stay hospitals in the United States</li> <li>Conducted annually since 1965</li> </ul>	<ul style="list-style-type: none"> <li>National</li> <li>Between 1988 and 2007 the NHDS collected data from approximately 270,000 inpatient records from a national sample of about 500 hospitals</li> </ul>	<ul style="list-style-type: none"> <li>Cross sectional</li> </ul>	<ul style="list-style-type: none"> <li>Abstractions of hospital records</li> </ul>	Linked with: <ul style="list-style-type: none"> <li>EPA Air Quality System Database (AQS) 2001-2006</li> </ul>	<ul style="list-style-type: none"> <li>National, population-based data</li> <li>Provides information on access and utilization of vision and eye care (via ICD-9 codes)</li> <li>Data are available annually</li> </ul>	<ul style="list-style-type: none"> <li>Includes only hospitals with an average length of stay &lt; 30 days</li> <li>Federal, military, and Department of Veterans Affairs hospitals, prison hospitals, and hospitals with &lt;6 beds are also excluded</li> </ul>
<b>The National Ambulatory Medical Care Survey (NAMCS)</b>	<ul style="list-style-type: none"> <li>Designed to collect data on medical care rendered in physicians' offices (symptoms, diagnoses, smoking habits, medications, demographics, services provided, payment source)</li> <li>The survey was conducted annually from 1973 to 1981, in 1985, and annually since 1989</li> </ul>	<ul style="list-style-type: none"> <li>National</li> <li>Each year, 3,000 physicians are randomly selected to provide data on approx. 30 patient-visits each</li> </ul>	<ul style="list-style-type: none"> <li>Cross sectional</li> </ul>	<ul style="list-style-type: none"> <li>Data is collected by the physician, randomly assigned to a 1-week reporting period</li> <li>Data is recorded on a standard encounter form provided to physician</li> </ul>	--	<ul style="list-style-type: none"> <li>Provides national and continuous data on access to and utilization of medical care</li> </ul>	<ul style="list-style-type: none"> <li>Relatively small sample size</li> <li>Restricted to visits to physicians (excludes visits to optometrists, nurse practitioners, etc)</li> </ul>



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		Population-level/ Population Size	Survey Type	Method of Data Collection	Data Linkage	Strengths	Limitations
<b>The National Hospital Ambulatory Medical Care Survey (NHAMCS)</b>	<ul style="list-style-type: none"> <li>• Designed to collect data on ambulatory care rendered in hospital emergency and outpatient departments (payment type, patients' complaints, diagnoses, diagnostic/screening services, procedures, medication therapy, disposition, types of providers seen, causes of injury)</li> <li>• The survey was conducted annually from 1973 to 1981, in 1985, and annually since 1989</li> </ul>	<ul style="list-style-type: none"> <li>• National</li> <li>• 500 nationally representative hospitals</li> </ul>	<ul style="list-style-type: none"> <li>• Cross sectional</li> </ul>	<ul style="list-style-type: none"> <li>• Clinic staff complete a Patient Record form for a random sample of patient visits during a 4-week reporting period</li> </ul>	--	<ul style="list-style-type: none"> <li>• Provides national and continuous data on access to and utilization of medical care</li> </ul>	<ul style="list-style-type: none"> <li>• Includes only short-stay hospitals (average length of stay &lt; 30 days)</li> <li>• Federal, military, and Department of Veterans Affairs hospitals, prison hospitals, and hospitals with &lt;6 beds are also excluded</li> </ul>



**Table 1b. General characteristics, strengths, and limitations of these surveillance systems, continued**

Survey	Data Element		
	Collection	Analysis	Limitations/Strengths of Interpretation and Generalizability
<b>National Health Interview Survey (NHIS)</b>	<ul style="list-style-type: none"> <li>• 428 geographically-based primary sampling units drawn from 1,900 PSUs covering all 50 states and the District of Columbia</li> <li>• Information collected on a variety of factors, including demographic and socioeconomic Design allows for oversampling of Blacks, Hispanics, and Asians</li> <li>• Some proxy measures are used</li> </ul>	<ul style="list-style-type: none"> <li>• Considered reliable and valid (1, 2)</li> <li>• Vision component contains two years of data; may not be able to perform small, subpopulation group analyses</li> </ul>	<ul style="list-style-type: none"> <li>• Supplemental vision questions were collected in 2002 and 2008 only</li> <li>• Question of reliability of vision data (Zhang 2007, "some estimates were higher for a dilated eye examination than for a visit to an eye doctor")</li> <li>• Infrequency of vision component limits the ability to monitor trends</li> </ul>
<b>Behavioral Risk Factor Surveillance System (BRFSS)</b>	<ul style="list-style-type: none"> <li>• Core component samples individuals in all 50 states to simulate a national representation of the population</li> <li>• Behavioral factors captured</li> <li>• No proxy measures</li> </ul>	<ul style="list-style-type: none"> <li>• Core questions considered moderately to highly reliable and valid (3)</li> <li>• Vision module available only for recent years, and in limited states</li> </ul>	<ul style="list-style-type: none"> <li>• Vision module is not a national representation</li> <li>• Few states repeated the vision module, limiting the ability to monitor trends</li> </ul>



**Table 1b. General characteristics, strengths, and limitations of these surveillance systems, continued**

Survey	Data Element		
	Collection	Analysis	Limitations/Strengths of Interpretation and Generalizability
<b>National Health and Nutrition Examination Survey (NHANES)</b>	<ul style="list-style-type: none"> <li>Geographically-based primary sampling units for a nationally representative sample</li> <li>Information collected on a variety of factors, including demographic, socioeconomic, dietary, and other health-related factors</li> <li>Examination component consists of medical, vision/eye, dental, and physiological measurements and laboratory tests</li> </ul>	<ul style="list-style-type: none"> <li>Ophthalmology examination only performed in 2005-2006 and 2007-2008, may not be able to perform small, subpopulation group analyses</li> <li>Vision exam and questionnaire performed from 1999-2008, will allow for analyses of subpopulations</li> </ul>	<ul style="list-style-type: none"> <li>Information on vision is collected continuously, so national trends over time can be monitored</li> <li>Minority populations are oversampled, allowing for evaluation of disparities in eye health over time</li> <li>NHANES 1999 to 2002 did not collect data on eye diseases</li> </ul>
<b>Medical Expenditure Panel Survey (MEPS)</b>	<ul style="list-style-type: none"> <li>Nationally representative sample drawn from NHIS participants</li> <li>Information collected on a variety of factors, including demographic, socioeconomic, health care access and utilization</li> <li>Surveys are repeated every 5-6 months</li> </ul>	<ul style="list-style-type: none"> <li>Vision impairment questions are repeated each year (data can be pooled over multiple years)</li> <li>Repeated measurements of individuals over time allows for analysis of changes in health care access and use, and health status</li> <li>Data allows for an examination of associations between access and use of health care services with vision impairment</li> </ul>	<ul style="list-style-type: none"> <li>Provides limited data on eye disease, vision-functioning, or participation restriction</li> <li>Information on vision is collected continuously, so national trends over time can be monitored</li> <li>Estimates of vision impairment are based on self-reported data, may represent less severe impairment</li> </ul>
<b>Medicare Current Beneficiary Survey (MCBS)</b>	<ul style="list-style-type: none"> <li>Geographically-based primary sampling units for a nationally representative sample</li> <li>Information collected on a variety of factors, including demographic, socioeconomic, health care access, health status</li> </ul>	<ul style="list-style-type: none"> <li>Participants remain in cohort for 4 years, follow-up of the same subjects over several years allows for the monitoring of changes in health care use and health outcomes over time</li> <li>Data can be used to determine expenditures related to vision</li> <li>Data for non-respondents to the interview can be obtained from Medicare files, so that</li> </ul>	<ul style="list-style-type: none"> <li>Information on vision of a nationally representative sample is collected continuously, so national trends over time can be monitored</li> </ul>



**Table 1b. General characteristics, strengths, and limitations of these surveillance systems, continued**

Survey	Data Element		
	Collection	Analysis	Limitations/Strengths of Interpretation and Generalizability
		characteristics of persons who refused to be interviewed, or could not be located, can be compared with those who completed the interview and used to adjust weighting	
<b>National Hospital Discharge Survey (NHDS)</b>	<p>Uses a modified three-stage probability design,</p> <ol style="list-style-type: none"> <li>1) primary sampling units (used by NHIS)</li> <li>2) hospitals within PSU's; and</li> <li>3) discharges within hospitals.</li> </ol> <ul style="list-style-type: none"> <li>• The modification was that the largest PSU's and hospitals were selected with certainty</li> </ul>	<ul style="list-style-type: none"> <li>• Population statistics from the NHDS are derived by a multistage estimation procedure that produces unbiased national e estimates</li> <li>• Probability design of the NHDS permits the calculation of sampling errors</li> </ul>	<ul style="list-style-type: none"> <li>• Population estimates with fewer than 30 records may not be valid, using data pooled over multiple years enhances the validity</li> </ul>
<b>The National Ambulatory Medical Care Survey (NAMCS)</b>	<ul style="list-style-type: none"> <li>• Uses a three-stage probability design</li> <li>• geographically-based primary sampling units (PSUs) (comprised of a a subset of PSUs used by NHIS)</li> <li>• physician practices within PSUs- stratified by specialty (includes ophthalmologists)</li> <li>• patient visits within practices</li> </ul>	<ul style="list-style-type: none"> <li>• Population statistics from the NAMCS are derived by a multistage estimation procedure that produces unbiased national e estimates</li> <li>• Probability design of the NAMCS permits the calculation of sampling errors</li> </ul>	<ul style="list-style-type: none"> <li>• Can monitor utilization of medical care- an external validation of access to care</li> <li>• Information is collected on a nationally representative sample on an annual basis, so national trends over time can be monitored</li> <li>• Information on source of pay for the visit is also collected (e.g. Medicaid, self-pay)</li> </ul>



**Table 1b. General characteristics, strengths, and limitations of these surveillance systems, continued**

Survey	Data Element		
	Collection	Analysis	Limitations/Strengths of Interpretation and Generalizability
<b>The National Hospital Ambulatory Medical Care Survey (NHAMCS)</b>	<ul style="list-style-type: none"> <li>• Uses a four-stage probability design,</li> <li>• primary sampling units (PSUs) are geographically-based</li> <li>• hospitals within these areas</li> <li>• clinics within outpatient departments</li> <li>• patient visits within these clinics</li> </ul>	<ul style="list-style-type: none"> <li>• Population statistics from the NHAMCS are derived by a multistage estimation procedure that produces unbiased national estimates</li> <li>• Probability design of the NHAMCS permits the calculation of sampling errors</li> </ul>	<ul style="list-style-type: none"> <li>• Can monitor utilization of medical care- an external validation of access to care</li> <li>• Information is collected on a nationally representative sample on an annual basis, so national trends over time can be monitored</li> <li>• Information on source of pay for the visit is also collected (e.g. Medicaid, self-pay)</li> </ul>

1. National Center for Health Statistics. National Health Interview Survey: research for the 1995-2004 redesign. Vital Health Stat 2. 1999;(126):1-119.
2. National Center for Health Statistics. Design and estimation for the National Health Interview Survey, 1995-2004. Vital Health Stat 2. 2000;(130):1-31.
3. Nelson DE, Holtzman D, Bolen J, Stanwyck CA, Mack KA. Reliability and validity of measures from the Behavioral Risk Factor Surveillance System (BRFSS). Social and Preventive Medicine, 2001;46Suppl 1:S03-S42.



**Table 2a. Vision-related questions of surveys**

Data Source	Eye Health		Eye Disease				
	Vision problems even with corrective wear (contact lenses or glasses)	Blind or unable to see at all	Cataracts	Glaucoma	Age-Related Macular Degeneration	Diabetic Retinopathy	Refractive Error
<b>National Health Interview Survey (NHIS)</b>	<ul style="list-style-type: none"> <li>Do you currently wear eyeglasses or contact lenses?</li> <li>Any other trouble seeing with one or both eyes EVEN when wearing glasses?</li> </ul>	<ul style="list-style-type: none"> <li>Blindness in one or both eyes?</li> </ul>	<ul style="list-style-type: none"> <li>Have you ever been told by a doctor or other health professional that you had cataracts?</li> <li>Have you lost any vision because of cataracts?</li> <li>Have you ever had cataract surgery?</li> </ul>	<ul style="list-style-type: none"> <li>Have you ever been told by a doctor or other health professional that you had glaucoma?</li> <li>Have you lost any vision because of glaucoma?</li> </ul>	<ul style="list-style-type: none"> <li>Have you ever been told by a doctor or other health professional that you had macular degeneration?</li> <li>Have you lost any vision because of macular degeneration?</li> </ul>	<ul style="list-style-type: none"> <li>Have you ever been told by a doctor or other health professional that you had diabetic retinopathy?</li> <li>Have you lost any vision because of diabetic retinopathy?</li> </ul>	-
	Core question	Core question	Supplement question	Supplement question	Supplement question	Supplement question	
<b>Behavioral Risk Factor Surveillance System (BRFSS)</b>	<ul style="list-style-type: none"> <li>[If you wear glasses or contact lenses, answer questions as if you are wearing them]</li> </ul>	<ul style="list-style-type: none"> <li><i>Optional response to several questions:</i> [Not applicable (blind)]</li> </ul>	<ul style="list-style-type: none"> <li>Have you ever been told by a doctor or other health professional that you NOW have cataracts?</li> </ul>	<ul style="list-style-type: none"> <li>Have you ever been told by a doctor or other health professional that you had glaucoma?</li> </ul>	<ul style="list-style-type: none"> <li>Have you ever been told by a doctor or other health professional that you had macular degeneration?</li> </ul>	<ul style="list-style-type: none"> <li>Have you ever been told by a doctor or other health professional that you had diabetic retinopathy?</li> </ul> NOTE: In diabetic module	-



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<b>National Health and Nutrition Examination Survey (NHANES)</b>	<ul style="list-style-type: none"> <li>• Vision exam includes measurement of monocular vision with usual correction ( if any)</li> <li>• Would you say your eyesight with glasses/contacts (if you wear them) is...[very poor-excellent]</li> <li>• How much of the time do you worry about your eyesight?</li> </ul>	<ul style="list-style-type: none"> <li>• With both eyes open, can you see light?</li> <li>• Are you blind in both eyes?</li> </ul>	<ul style="list-style-type: none"> <li>• Have you ever had a cataract operation?</li> </ul>	<ul style="list-style-type: none"> <li>• Have you ever been told by an eye doctor that you have glaucoma?</li> <li>• Ophthalmology exam includes Frequency Doubling Technology to test visual loss from glaucoma</li> </ul>	<ul style="list-style-type: none"> <li>• Have you ever been told by an eye doctor that you have age-related macular degeneration?</li> <li>• Ophthalmology exam includes an ophthalmic digital imaging system (Retinal Photography) to assess the presence of retinal disease</li> </ul>	<ul style="list-style-type: none"> <li>• Ophthalmology exam includes an ophthalmic digital imaging system (Retinal Photography) to assess the presence of retinal disease</li> </ul>	<ul style="list-style-type: none"> <li>• Vision exam includes a retinoscopy and measurement of current eyeglass prescription</li> </ul>
<b>Medical Expenditure Panel Survey (MEPS)</b>	<ul style="list-style-type: none"> <li>• Do you currently wear eyeglasses or contact lenses?</li> <li>• Do you have difficulty seeing with glasses or contacts (if you use them)</li> </ul>	<ul style="list-style-type: none"> <li>• Can you not see anything at all, that is, are you blind?</li> </ul>	-	-	-	<ul style="list-style-type: none"> <li>• Has your diabetes caused problems with your eyes that needed to be treated by an ophthalmologist? [diabetes module]</li> </ul>	-



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	Vision problems even with corrective wear (contact lenses or glasses)	Blind or unable to see at all	Cataracts	Glaucoma	Age-Related Macular Degeneration	Diabetic Retinopathy	Refractive Error
<b>Medicare Current Beneficiary Survey (MCBS)</b>	<ul style="list-style-type: none"> <li>Do you wear eyeglasses or contact lenses?</li> <li>Which statement best describes your vision (while wearing glasses or contact lenses) [no trouble seeing-no usable vision]</li> </ul>	-	-	-	-	<ul style="list-style-type: none"> <li>Do you have any problems with your eyes as a result of your diabetes? [asked only in 2000, 2002, and 2004]</li> </ul>	-
<b>National Hospital Discharge Survey (NHDS)</b>	<ul style="list-style-type: none"> <li>ICD-9-CM diagnosis and procedure codes related to eye diseases or disorders</li> </ul>	<ul style="list-style-type: none"> <li>ICD-9-CM diagnosis and procedure codes related to eye diseases or disorders</li> </ul>	<ul style="list-style-type: none"> <li>ICD-9-CM diagnosis and procedure codes related to eye diseases or disorders</li> </ul>	<ul style="list-style-type: none"> <li>ICD-9-CM diagnosis and procedure codes related to eye diseases or disorders</li> </ul>	<ul style="list-style-type: none"> <li>ICD-9-CM diagnosis and procedure codes related to eye diseases or disorders</li> </ul>	<ul style="list-style-type: none"> <li>ICD-9-CM diagnosis and procedure codes related to eye diseases or disorders</li> </ul>	<ul style="list-style-type: none"> <li>ICD-9-CM diagnosis and procedure codes related to eye diseases or disorders</li> </ul>



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Data Source	Eye Health		Eye Disease				
	Vision problems even with corrective wear (contact lenses or glasses)	Blind or unable to see at all	Cataracts	Glaucoma	Age-Related Macular Degeneration	Diabetic Retinopathy	Refractive Error
<b>The National Ambulatory Medical Care Survey (NAMCS)</b>	<ul style="list-style-type: none"> <li>ICD-9-CM diagnosis and procedure codes related to eye diseases or disorders</li> </ul>	<ul style="list-style-type: none"> <li>ICD-9-CM diagnosis and procedure codes related to eye diseases or disorders</li> </ul>	<ul style="list-style-type: none"> <li>ICD-9-CM diagnosis and procedure codes related to eye diseases or disorders</li> </ul>	<ul style="list-style-type: none"> <li>ICD-9-CM diagnosis and procedure codes related to eye diseases or disorders</li> </ul>	<ul style="list-style-type: none"> <li>ICD-9-CM diagnosis and procedure codes related to eye diseases or disorders</li> </ul>	<ul style="list-style-type: none"> <li>ICD-9-CM diagnosis and procedure codes related to eye diseases or disorders</li> </ul>	<ul style="list-style-type: none"> <li>ICD-9-CM diagnosis and procedure codes related to eye diseases or disorders</li> </ul>
<b>The National Hospital Ambulatory Medical Care Survey (NHAMCS)</b>	<ul style="list-style-type: none"> <li>ICD-9-CM diagnosis and procedure codes related to eye diseases or disorders</li> </ul>	<ul style="list-style-type: none"> <li>ICD-9-CM diagnosis and procedure codes related to eye diseases or disorders</li> </ul>	<ul style="list-style-type: none"> <li>ICD-9-CM diagnosis and procedure codes related to eye diseases or disorders</li> </ul>	<ul style="list-style-type: none"> <li>ICD-9-CM diagnosis and procedure codes related to eye diseases or disorders</li> </ul>	<ul style="list-style-type: none"> <li>ICD-9-CM diagnosis and procedure codes related to eye diseases or disorders</li> </ul>	<ul style="list-style-type: none"> <li>ICD-9-CM diagnosis and procedure codes related to eye diseases or disorders</li> </ul>	<ul style="list-style-type: none"> <li>ICD-9-CM diagnosis and procedure codes related to eye diseases or disorders</li> </ul>



**Table 2b. Vision-related questions of surveys, continued**

Data Source	Vision-Related Functioning (or Activity Limitations)						Participation Restriction
	Difficulty with distance vision	Difficulty with near vision	Difficulty with night vision	Difficulty with day vision	Difficulty with peripheral vision	Difficulty with contrast vision	Restricted in performing usual activities
<b>National Health Interview Survey (NHIS)</b>	<ul style="list-style-type: none"> <li>Do you wear eyeglasses or contact lenses to drive, read road and street signs, watch TV, or see things in the distance?</li> </ul>	<ul style="list-style-type: none"> <li>Do you wear eyeglasses or contact lenses to read books or newspapers, write, or do other things that require you to see well up close, such as cooking, sewing or fixing things?</li> <li>[Because] of your eyesight, how difficult is it for you to read ordinary print in newspaper?</li> </ul>	<ul style="list-style-type: none"> <li>[Because] of your eyesight, how difficult is it for you to go down steps, stairs, or curbs in dim light or at night?</li> </ul>	<ul style="list-style-type: none"> <li>[Because] of your eyesight, how difficult is it for you to drive during daytime in familiar places?</li> </ul>	<ul style="list-style-type: none"> <li>[Because] of your eyesight, how difficult is it for you to notice objects off to the side while you are walking along?</li> </ul>	<ul style="list-style-type: none"> <li>[Because] of your eyesight, how difficult is it for you to find something on a crowded shelf?</li> </ul>	<ul style="list-style-type: none"> <li>[Because] of your eyesight, how difficult is it for you to do work or hobbies that require you to see well up close such as cooking, sewing, fixing things around the house or using hand tools?</li> </ul>
	Supplement question	Supplement question	Supplement question	Supplement question	Supplement question	Supplement question	Supplement Question
<b>Behavioral Risk Factor Surveillance System (BRFSS)</b>	<ul style="list-style-type: none"> <li>How much difficulty, if any, do you have in recognizing a friend across the street?</li> </ul>	<ul style="list-style-type: none"> <li>How much difficulty, if any, do you have in reading print in newspaper, magazine, recipe, menu, or numbers on the telephone?</li> </ul>	-	-	-	-	-



**Table 2b. Vision-related questions of surveys, continued**

Data Source	Vision-Related Functioning (or Activity Limitations)						Participation Restriction
	Difficulty with distance vision	Difficulty with near vision	Difficulty with night vision	Difficulty with day vision	Difficulty with peripheral vision	Difficulty with contrast vision	Restricted in performing usual activities
<b>National Health and Nutrition Examination Survey (NHANES)</b>	-	<ul style="list-style-type: none"> <li>How much difficulty, if any, do you have in reading print in newspaper, or doing work/hobbies to see well up close...?</li> </ul>	<ul style="list-style-type: none"> <li>How much difficulty, if any, do you have in going down steps, stairs, or curbs in dim light or at night?</li> </ul>	<ul style="list-style-type: none"> <li>How much difficulty do you have driving during the daytime in familiar places?</li> </ul>	<ul style="list-style-type: none"> <li>How much difficulty do you have in noticing objects off to the side while walking?</li> <li>Ophthalmology exam includes a visual field test of peripheral vision</li> </ul>	<ul style="list-style-type: none"> <li>How much difficulty do you have finding something on a crowded shelf?</li> </ul>	<ul style="list-style-type: none"> <li>How limited are you in how long you can work or do other daily activities such as housework, child care, school, or community activities because of your vision?</li> </ul>
<b>Medical Expenditure Panel Survey (MEPS)</b>	<ul style="list-style-type: none"> <li>With glasses or contacts, can you see well enough to recognize familiar people if they are two or three feet away?</li> </ul>	<ul style="list-style-type: none"> <li>With glasses or contacts, can you see well enough to read ordinary newspaper print, even if you cannot read?</li> </ul>	-	-	-	-	-



**Table 2b. Vision-related questions of surveys, continued**

Data Source	Vision-Related Functioning (or Activity Limitations)						Participation Restriction
	Difficulty with distance vision	Difficulty with near vision	Difficulty with night vision	Difficulty with day vision	Difficulty with peripheral vision	Difficulty with contrast vision	Restricted in performing usual activities
Medicare Current Beneficiary Survey (MCBS)	-	<ul style="list-style-type: none"> <li>Because of your difficulty seeing, how much trouble do you have with prescription labels or medical instructions?</li> </ul>	-	-	-	-	<ul style="list-style-type: none"> <li>Because of your difficulty seeing, how much trouble do you have with prescription labels or medical instructions?</li> <li>Because of your difficulty seeing, how much trouble do you have finding out things you need to know about Medicare?</li> <li>Because of your difficulty seeing, how much trouble do you have obtaining medical care, such as finding care or getting there when you need it?</li> </ul>



**Table 2b. Vision-related questions of surveys, continued**

Data Source	Vision-Related Functioning (or Activity Limitations)						Participation Restriction
	Difficulty with distance vision	Difficulty with near vision	Difficulty with night vision	Difficulty with day vision	Difficulty with peripheral vision	Difficulty with contrast vision	Restricted in performing usual activities
National Hospital Discharge Survey (NHDS)	-	-	-	-	-	-	-
The National Ambulatory Medical Care Survey (NAMCS)	-	-	-	-	-	-	-



**Table 2b. Vision-related questions of surveys, continued**

Data Source	Vision-Related Functioning (or Activity Limitations)						Participation Restriction
	Difficulty with distance vision	Difficulty with near vision	Difficulty with night vision	Difficulty with day vision	Difficulty with peripheral vision	Difficulty with contrast vision	Restricted in performing usual activities
The National Hospital Ambulatory Medical Care Survey (NHAMCS)	-	-	-	-	-	-	-



**Table 2c. Vision-related questions of surveys, continued**

Data Source	Access to Vision/Eye Care				Access to Vision/Eye Supports and Services	
	Last time visited eye care professional	Eye care professional consultation within past year	Reason for no eye/ vision evaluation up in last 12 months	Vision/ eye health insurance	Use of rehabilitation services	Use of adaptive devices
<b>National Health Interview Survey (NHIS)</b>	<ul style="list-style-type: none"> <li>When was the last time you had an eye exam in which the pupils were dilated?</li> </ul>	<ul style="list-style-type: none"> <li>During the past 12 months, have you seen or talked to an optometrist, ophthalmologist, or eye doctor?</li> </ul>	-	<ul style="list-style-type: none"> <li>During the past 12 months, was there any time when you needed eyeglasses but didn't get it because you couldn't afford it?</li> </ul>	<ul style="list-style-type: none"> <li>Do you use any vision rehabilitation services, such as job training, counseling, or training in daily living skills and mobility?</li> </ul>	<ul style="list-style-type: none"> <li>Do you use any adaptive devices such as telescopic or other prescriptive lenses, magnifiers, large print or talking materials, CCTV, white cane, or guide dog?</li> </ul>
	Supplement question	Core question		Core question	Supplement Question	Supplement Question
<b>Behavioral Risk Factor Surveillance System (BRFSS)</b>	<ul style="list-style-type: none"> <li>When was the last time you had your eyes examined by any doctor or eye care provider?</li> <li>When was the last time you had an eye exam in which the pupils were dilated?</li> </ul>	-	<ul style="list-style-type: none"> <li>What is the main reason you have not visited an eye care professional in the past 12 months?</li> </ul>	<ul style="list-style-type: none"> <li>Do you have any kind of health insurance coverage for eye exams?</li> </ul>	-	-



**Table 2c. Vision-related questions of surveys, continued**

Data Source	Access to Vision/Eye Care				Access to Vision/Eye Supports and Services	
	Last time visited eye care professional	Eye care professional consultation within past year	Reason for no eye/ vision evaluation up in last 12 months	Vision/ eye health insurance	Use of rehabilitation services	Use of adaptive devices
<b>National Health and Nutrition Examination Survey (NHANES)</b>	-	-	-	-	-	-
<b>Medical Expenditure Panel Survey (MEPS)</b>	<ul style="list-style-type: none"> <li>Which of the following years did you have an eye exam in which your pupils were dilated? [diabetes module]</li> </ul>	-	<ul style="list-style-type: none"> <li>What is the reason for not having an eye examination more recently? [asked only in 2002 and 2004]</li> </ul>	-	-	<ul style="list-style-type: none"> <li>Does anyone in the family wear eyeglasses or contact lenses?</li> </ul>



**Table 2c. Vision-related questions of surveys, continued**

Data Source	Access to Vision/Eye Care				Access to Vision/Eye Supports and Services	
	Last time visited eye care professional	Eye care professional consultation within past year	Reason for no eye/ vision evaluation up in last 12 months	Vision/ eye health insurance	Use of rehabilitation services	Use of adaptive devices
<b>Medicare Current Beneficiary Survey (MCBS)</b>	<ul style="list-style-type: none"> <li>How long has it been since your last eye examination by an eye doctor?</li> </ul>	<ul style="list-style-type: none"> <li>Have you had an eye examination by an eye doctor since a year ago?</li> </ul>	-	-	-	-
<b>National Hospital Discharge Survey (NHDS)</b>	-	-	-	-	-	-



**Table 2c. Vision-related questions of surveys, continued**

Data Source	Access to Vision/Eye Care				Access to Vision/Eye Supports and Services	
	Last time visited eye care professional	Eye care professional consultation within past year	Reason for no eye/vision evaluation up in last 12 months	Vision/ eye health insurance	Use of rehabilitation services	Use of adaptive devices
The National Ambulatory Medical Care Survey (NAMCS)	yes	-	-	yes	yes	yes
The National Hospital Ambulatory Medical Care Survey (NHAMCS)	-	-	-	-	yes	yes



**Table 3. Capacity of current surveillance systems to respond to uses of public health surveillance**

	Estimate magnitude of problem	Monitor Disparities	Generate and test hypotheses	Stimulate research, program design, implementation and evaluation	Detect changes in health practice (access, utilization, behavior, etc)
<b>National Health Interview Survey (NHIS)</b>	<ul style="list-style-type: none"> <li>• Vision supplement collected for two years of data; may not be able to perform small, subpopulation group analyses, which requires combining multiple years of data, but can detect change between these years in larger population (e.g. prevalence of glaucoma in African Americans)</li> <li>• Cannot detect trends over time</li> </ul>	<ul style="list-style-type: none"> <li>• Contains information on:                             <ul style="list-style-type: none"> <li>vGender</li> <li>vAge</li> <li>vRace and Ethnicity (Hispanic and Asian subgroups;</li> <li>vSES ( income, educational level, insurance status)</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Can generate and test hypotheses on all 6 areas of interest</li> <li>• Can generate and test hypotheses for 4 of 5 eye conditions of interest (does not cover refractive error)</li> </ul>	<ul style="list-style-type: none"> <li>• Provides data on distributions as well as vision areas of interest</li> </ul>	<ul style="list-style-type: none"> <li>• Would benefit from additional years of data, collection consistency over time</li> <li>• Have limited ability to detect change</li> </ul>
<b>Behavioral Risk Factor Surveillance System (BRFSS)</b>	<ul style="list-style-type: none"> <li>• Vision module collected in limited number of states, many of which did not repeat the survey</li> <li>• Cannot detect trends over time</li> </ul>	<ul style="list-style-type: none"> <li>• Contains information on:                             <ul style="list-style-type: none"> <li>vGender</li> <li>vAge</li> <li>vRace and Ethnicity</li> <li>vSES ( income, educational level, insurance status)</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Can generate and test hypotheses on 4 of 6 areas of interest (excludes participation restriction and use of adaptive devices)</li> <li>• Can generate and test hypotheses for 3 of 5 eye conditions of interest (does not cover refractive error nor diabetic retinopathy)</li> </ul>	<ul style="list-style-type: none"> <li>• Provides data on distributions as well as vision areas of interest</li> </ul>	<ul style="list-style-type: none"> <li>• Currently can detect changes in health practice for those states that administered survey more than one year (Alabama, Connecticut, Georgia, New York, Tennessee)</li> </ul>



**Table 3. Capacity of current surveillance systems to respond to uses of public health surveillance**

	Estimate magnitude of problem	Monitor Disparities	Generate and test hypotheses	Stimulate research, program design, implementation and evaluation	Detect changes in health practice (access, utilization, behavior, etc)
<b>National Health and Nutrition Examination Survey (NHANES)</b>	<ul style="list-style-type: none"> <li>Data on vision is collected from a representative sample over several years, so that population trends over time can be measured</li> </ul>	<ul style="list-style-type: none"> <li>Contains information on:                             <ul style="list-style-type: none"> <li>√Gender</li> <li>√Age</li> <li>√Race and Ethnicity</li> <li>√SES ( income, educational level, insurance status)</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Can generate and test hypotheses on 4 of 6 areas of interest (no information on access to vision health care or support and services)</li> <li>Can generate and test hypotheses for 5 of 5 eye conditions of interest</li> </ul>	<ul style="list-style-type: none"> <li>Provides data on distributions as well as vision areas of interest</li> </ul>	<ul style="list-style-type: none"> <li>Survey questions are repeated each year, can monitor population trends and long-term population-level changes</li> </ul>
<b>Medical Expenditure Panel Survey (MEPS)</b>		<ul style="list-style-type: none"> <li>Contains information on:                             <ul style="list-style-type: none"> <li>√Gender</li> <li>√Age</li> <li>√Race and Ethnicity</li> <li>√SES ( income, educational level, insurance status)</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Can generate and test hypotheses on 3 of 6 areas of interest (eye health, access to eye care, access to supportive services)</li> <li>Can generate and test hypotheses for 1 of 5 eye conditions of interest (diabetic retinopathy)</li> </ul>	<ul style="list-style-type: none"> <li>Provides data on distributions as well as vision areas of interest</li> </ul>	<ul style="list-style-type: none"> <li>Repeated visits for individuals allows for monitoring of changes within individuals (gaps in coverage, health care usage)</li> <li>Survey questions on health care access and utilization (as well as vision) are repeated each year, can monitor population trends</li> </ul>



**Table 3. Capacity of current surveillance systems to respond to uses of public health surveillance**

	Estimate magnitude of problem	Monitor Disparities	Generate and test hypotheses	Stimulate research, program design, implementation and evaluation	Detect changes in health practice (access, utilization, behavior, etc)
<b>Medicare Current Beneficiary Survey (MCBS)</b>	<ul style="list-style-type: none"> <li>Limited vision and eye disease information collected for a national population on an annual basis- in a subgroup of patients receiving Medicare benefits</li> </ul>	<ul style="list-style-type: none"> <li>Contains information on:                             <ul style="list-style-type: none"> <li>vGender</li> <li>vAge</li> <li>vRace and Ethnicity</li> <li>vSES ( income, educational level, insurance coverage)</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Can generate and test hypotheses on 5 of 6 areas of interest (no information on access to supports/services, limited information on access to eye health care)</li> <li>Can generate and test hypotheses for 2 of 5 eye conditions of interest (cataracts and diabetic retinopathy)</li> <li>Limited information on vision</li> </ul>	<ul style="list-style-type: none"> <li>Provides data on distributions as well as vision areas of interest</li> </ul>	<ul style="list-style-type: none"> <li>Repeated visits within a single panel allows for monitoring of changes within individuals (gaps in coverage, health care usage, etc)</li> <li>Survey questions on health care utilization and expenditures (as well as vision) are repeated each year, can monitor population trends</li> </ul>
<b>National Hospital Discharge Survey (NHDS)</b>	<ul style="list-style-type: none"> <li>Hospital diagnoses and procedure codes can be used to produce national estimates of more severe eye disease and related treatment</li> </ul>	<ul style="list-style-type: none"> <li>Contains information on:                             <ul style="list-style-type: none"> <li>vGender</li> <li>vAge</li> <li>vRace and Ethnicity</li> <li>vSES (insurance coverage)</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Can generate and test hypotheses related to advanced eye disease and treatment as well as associated disparities</li> </ul>	<ul style="list-style-type: none"> <li>Provides data on distributions of disease and treatment</li> </ul>	<ul style="list-style-type: none"> <li>Can detect changes in use of inpatient hospital procedures</li> </ul>



**Table 3. Capacity of current surveillance systems to respond to uses of public health surveillance**

	Estimate magnitude of problem	Monitor Disparities	Generate and test hypotheses	Stimulate research, program design, implementation and evaluation	Detect changes in health practice (access, utilization, behavior, etc)
<b>The National Ambulatory Medical Care Survey (NAMCS)</b>	<ul style="list-style-type: none"> <li>NAMCS data can be used to produce statistics on conditions most often treated (particularly in ophthalmologists' offices)</li> </ul>	<ul style="list-style-type: none"> <li>Contains information on:                             <ul style="list-style-type: none"> <li>√Gender</li> <li>√Age</li> <li>√Race and Ethnicity</li> <li>√SES (insurance coverage)</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Can generate and test hypotheses related to demographic characteristics of persons receiving eye care, patterns of eye care services (surgical and non-surgical), and expected payment source</li> </ul>	<ul style="list-style-type: none"> <li>Can inform strategies for prevention of vision loss and identify barriers to use of eye care services</li> </ul>	<ul style="list-style-type: none"> <li>Can improve our knowledge of medical practice patterns in the US (diagnostic and therapeutic services rendered, insurance coverage, continuity of care, etc)</li> </ul>
<b>The National Hospital Ambulatory Medical Care Survey (NHAMCS)</b>	<ul style="list-style-type: none"> <li>NHAMCS data can be used to produce statistics on more severe eye disease and conditions treated in hospital emergency and outpatient departments and for less severe conditions among the uninsured (those using the emergency department for more routine care)</li> </ul>	<ul style="list-style-type: none"> <li>Provides a national description of hospital-based patient care among demographically diverse subgroups</li> </ul>	<ul style="list-style-type: none"> <li>Can generate and test hypotheses related to demographic characteristics of persons receiving eye care, patterns of eye care services (surgical and non-surgical), and expected payment source</li> </ul>	<ul style="list-style-type: none"> <li>Can inform strategies for prevention of vision loss and identify barriers to use of eye care services</li> </ul>	<ul style="list-style-type: none"> <li>Can improve our knowledge of medical practice patterns in the US (diagnostic and therapeutic services rendered, insurance coverage, etc)</li> </ul>